A climate of psychological safety enhances the success of front end teams

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ABSTRACT[1]

This paper contributes to the discussion concerning initiative in teams at the front end of new product development processes (innovative teams). In contrast to the general opinion presented in the literature, this study points out that unstructured innovative teams are able to show as much initiative in developing new ideas or in finding quick solutions as are structured innovative teams. Therefore we analyze the relationship between teamwork quality and team initiative in structured and unstructured teams at the front end of a new product development process and, in particular, we focus on a climate of psychological safety. To examine this relationship, data were collected from 100 team members from different departments in a multinational corporation. As has been pointed out in literature previously, where a team leader provides little structure at the micro level for team members there is a negative effect on displays of initiative in the very early stages of the innovation process. However we can demonstrate that this effect can be reduced by a climate of psychological safety. Thus, it can be stated that unstructured teamwork combined with a climate of psychological safety is the way for teams at the front end of a new product development process to be successful.

Keywords
Innovative team, team quality, initiative, climate of psychological safety, front end

[11] Some findings of this study were presented in the Technology and Innovation Management Division at the Academy of Management 2012 and the Portland International Conference for Management of Engineering and Technology 2012.

A climate of psychological safety enhances the success of front end teams

INTRODUCTION

Current literature underlines the relevance of the front end—the very early stage of the new product development process—for successful product development and thus for companies' success (e.g. Brem and Voigt, 2009; Kim and Wilemon, 2002; Martinsuo and Poskela, 2011; Poskela and Martinsuo 2009; Reid and De Brentani, 2004; De Brentani and Reid 2012). While most scholars have concentrated on understanding and improving outcomes of the new product development process such as project evaluation, market analysis or the launch of a new product launch, less attention has been given to the fuzzy front end of the new product development process (De Brentani and Reid, 2012). The very early stage of the new product development process is very fuzzy and unspecific and characterized by a high degree of uncertainty (Moenaert et al., 1995). Scholars in the field of new product development research have discussed ''front activities'' for more than 20 years (Crawford, 1980). Activities in that stage of the new product development process are often confronted with problems and opportunities in the fields of structure and/or identification (Leifer et al. 2000; Urbal and Hause, 1993). At this stage a company - usually a project team (innovative team) - has to produce several ideas, has to be creative. Thus, the activities in this study are characterized by exploration (Cooper, 1990; Cooper and Kleinschmidt, 1986). In the stages of the product development process that follow the front-end stage the numerous ideas generated by the front-end team are evaluated and sorted in terms of their worth to the company (exploitation). The high degree of complexity and the dynamic of the fuzzy front end in the new development process create uncertainty and make a decision about following an idea or not even harder (De Brentani and Reid, 2012). Thus, more research is needed to support the fuzzy front-end activities and to help companies achieve greater success in their efforts to develop new products.

A team at the front end has to manage those challenges to be successful and needs therefore a high degree of initiative or proactivism. Thus, it is not surprising that an extensive body of literature indicates the relevance of teamwork for project success in innovation processes (for an overview see Bakker et al., 2012). The relevant literature is based upon the assumption that the quality of teamwork affects team performance (e.g. Edmondson 2012; Hoegl and Gemuenden, 2001; Hoegl and Proserpio, 2004). Due to the fact that in the very early stage of the new product development process creativity seems to be a key issue (Hoegl and Parboteeah, 2007) and therefore, initiative respectively proactivism is important (similar to the findings of Seibert et al. (1999) on a personal

level in relation to an individual's career, the author of this paper assume that the quality of teamwork quality might also influence team initiative, and thus the team's proactivism. This influence differs depending upon the team's structure to the degree that the more unstructured a team is, the less the initiative it displays (Gladstein 1984; Lindner and Wald, 2010; Pinto et al., 1993). With this in mind, companies try to structure their innovative teams to ensure they will be successful and will avoid a lack of structure. This decision implies costs arise from maintaining the coordination and organization of an innovative team. Furthermore, the positive effects of less structured teams, for example greater creativity in solving the tasks assigned to members, are lost (Hirst et al., 2011). Additionally, in complex environments such as the front end of the new product development process structure is seen to be negative in relation to the success of teams (Drucker, 1999; Mowery and Rosenberg, 1998; Veryzer, 1998). Thus companies are faced with the challenge not to structure a team in a complex and unstable environment (Kanter, 1995). In general, very little is known regarding the influence of the organization on activities in the very early stages of the fuzzy front end (Reid and de Brentani, 2012). Thus, it is important to understand whether there are any structures (Davenport, 1993) that can support organizations' management of the early stages at the front end of the new product development process. The question arises as to how a company can profit from the positive effects of a less structured innovative team, especially in a complex environment such as the front end in the new product development process, and how at the same time an unstructured team can be as successful as a structured team. A growing interest in the literature can be identified concerning the relationship between psychological climate and the success or failure of teams (e.g. Adenfelt and Lagerstroem, 2006; Hoegle et al., 2007; Levin and Skulmoski, 2001; Magni et al. forthcoming; Newell et al., 2004). A climate of psychological safety means that mistakes by members are permitted and such mistakes are not directly punished; and that a high level of trust between team members is established (Baer and Frese, 2003). But until today no research can be found which tries to investigate a climate of psychological safety combined with the quality of teamwork in less structured innovative teams to achieve better initiative by team members.

We hypothesize that a climate of psychological safety might be able to reduce the negative effects of the unstructuredness of a team in the early stages of the front end of a new product development process. We do not understand a climate of psychological safety as a substitute for structure but we assume that a climate of psychological safety might be more efficient regarding proactive behaviour of the team members under specific circumstances, such as under the very high degree of uncertainty found in the very early stages of the new product development process. Therefore this paper contributes to the discussion about the initiative of team members in unstructured projects at the front end. It adds the new factor climate of psychological safety to teamwork quality to enhance innova-

tive team initiative. In order to prove this, we questioned 100 team members from a multinational company, who were organized in structured and unstructured innovative teams and then we analyzed the results with regard to the influence of a climate of psychological safety upon initiative.

This paper is structured as follows: first, the basics of the theoretical research into teams in front ends are shown; second, the hypotheses are derived; third, the sample as well as the research methods are explained before the results are presented and discussed; and finally, the paper closes with a discussion of the main findings of this study and a short conclusion.

THEORY AND HYPOTHESES

Teamwork quality at the front end

Since the front end is identified as the most important stage in the whole new product development process, many researchers focus on the management possibilities to handle the front end stage. A huge number of studies try to explain how to manage different front-end activities (e.g. Brem and Voigt, 2009; De Brentani and Reid, 2012; Koen et al., 2002; Nobelius and Trygg, 2002; Sandmeier et al., 2004). The diversity of these front-end models can be explained by their different scopes of design. While some concepts focus on process activities (Singh, 2000), others concentrate on the success of tasks or on the sequential process of single activities (Cooper, 2001; Murphy and Kumar, 1997). In addition, some researchers investigate the different methods and roles of front-end processes. However, most models agree on the relevance of teams for success. Usually, a team consists of two or more people working together to achieve a specific task (Cooke and Szumal, 1994; Hackmann, 1987; Hauptman and Hirji, 1996; Mullen and Cooper, 1994). The most important issue related to teams is the quality of their work. Thus, it is not surprising that several scholars focus on teamwork quality. Teamwork quality is one of the main challenges for companies to be successfully innovative (Hirst et al., 2011; Hoegl and Gemuenden, 2001; Hoegl and Parboteeah, 2007; Hoegl and Proserpio, 2004;).

Many scholars such as Li (2008), who focused on communication, cooperation and coordination in teams, base their definition of teamwork quality on the analysis of the interactions between the team members . Hoegl and Gemuenden (2001) added coherence, effort and the balance of the team members' contributions to these factors to describe teamwork quality. Similar findings can be seen in the study of Werner and Lester (2001) who analyzed 107 student teams and measured teamwork

quality by the dimensions social support, communication, division of work and team spirit. The key factors of teamwork quality seem to be communication, coordination, mutual support, effort of the team members to achieve the team target and coherence. At the front end of the new product development process interactions between team members are the key to the success of a team. Thus, we describe in the following paragraphs the reasons for the relevance of such factors especially for teams at the front end:

(1) Communication: One of the main research topics in investigating team processes is that of a team's internal communication (Campion et al., 1993; Griffin and Hauser, 1992; Moenaert et al., 1995; Puck and Rygl, 2006). Communication, the positive exchange of information between team members (Hoegl and Gemuenden, 2001), is relevant due to the fact that team members of teams at the front end are usually from different departments and educational backgrounds and may well have entirely different approaches to solving problems or to being successful and therefore to the generation of new ideas. Puck and Rygl (2006) underline this by pointing out how important an open communication system between team members is.

(2) Coordination: Coordination is the effective management of dependencies in the working process of teams (Adler, 1995; Faraj and Sproull, 2000). To solve a common team task, individual aspects are given to different team members who then work in parallel to solve a part of the designated problem. The more complex the task is - front end tasks are usually complex - the stronger the coordination has to be when splitting and summarizing these different parts (Hoegl and Gemuenden, 2001). In particular, the goals, activities, team members and dependencies have to be coordinated internally (in the team, not given by the top management).

(3) Mutual support: Much research has focused on the aspect of mutual support in innovative teams (Hoegl and Gemuenden, 2001; Werner, and Lester, 2001; Zarraga and Bonache, 2003). The assumption is that people work together much better in a cooperative rather than a competitive environment. Respect for each other and mutual help and support are very important for efficient teamwork. Respecting different ideas that arise from the different backgrounds of the team members is also a major aspect of efficient teamwork (Hoegl and Gemuenden, 2001), especially as the development of such ideas could result in new solutions for various problems. Successful interactions between team members are essential for efficient working, e.g. to be fair and to allow constructive discussions (Zarraga and Bonache, 2003). It is very important that every team member makes a contribution to the task; otherwise the potential of the team cannot be fully realized (Hoegl and Gemuenden, 2001).

(4) Effort: The effort of team members is based upon two different aspects. First of all, team members have to accept and respect the working norms of the exercise so as to avoid conflict and enhance the quality of the teamwork. These norms are very important in structuring the team task and regulating the relevance of each exercise. Every team member is also assigned his or her tasks based upon these norms (Werner and Lester, 2001). Therefore, their efforts to complete their tasks should be comparable (Hoegl and Gemuenden, 2001). In cases where there are no existing norms the probability of conflict between the team members and of destructive interactions is increased. The result would be the failure of teamwork.

(5) Coherence: Team coherence is the willingness of team members to be part of the innovative team (Forrester and Tashchian, 2006; Hoegl and Gemuenden, 2001; Kozlowski and Ilgen, 2006). Often the task itself, other team members or the team activities can be the reason for this need (Kozlowski and Ilgen, 2006; Mullen and Copper, 1994). The literature does not clarify completely which intensity of coherence is the best (e.g. Mullen and Copper, 1994) and there are differing opinions. But all researchers are certain that a certain degree of coherence as important for efficient team work (Hoegl and Gemuenden, 2001).

Team initiative at the front end

While most scholars agree on the different facets of teamwork quality, several approaches concerning the measurement of team success exist. Two different concepts to measure team success are well known in research: reactive concepts (e.g. McGrath, 1964, 114) and active approaches (e.g. Hoegl and Parboteeah, 2007; Magni et al., (forthcoming); see for an overview Frese and Frey, 2001). Concerning reactive approaches, success of a team is measured usually by the criterion of whether a team member has executed a task in accordance with the demands determined beforehand (Hackman, and Oldham, 1975). We follow the increasing number of researchers who place a special focus on active performance by team members, in this case by displaying initiative respectively proactivism (Baer and Frese, 2003; Griffin et al., 2007). Several reasons can be identified why an active performance concept is very important for research and business management. Two major arguments are: a) Reactive performance models assume that employees follow instructions, task descriptions, and rules—thus, the better they do that, the better their performance. Such a performance model might be adequate for routine-based and traditional jobs. However, innovative or creative work, such as is needed at the front end of a new product development process, ask for a faster pace in terms of changes, less supervision, higher interweaving of technology and the need for greater communication between the team members (Ilgen and Pulakos, 1999). Proactive personali-

ty or personal initiative behaviour improves organizational performance, as is proven by Baer and Frese (2003), Crant (1995), Koop et al. (2000), Krauss et al.(2005), Miron et al. (2004) and Utsch and Rauch (2000).

Initiative is an individual's work behaviour, one particularly characterized by its self-starting nature, its pro-active approach, and persistence in overcoming difficulties that arise in the pursuit of a goal (Frese et al., 1996; Frese et al. 1997; Miron et al., 2004). Self-starting signifies that a person does something without being either asked or given explicit instructions to do so. Moreover, specific role requirements are missing. Being proactive means an employee takes a long-term focus instead of waiting until they have to respond to a demand; employees have some foresight and future focus (anticipating new or recurring problems, or emerging opportunities) and try to deal with them pro-actively. Finally, persistence is important for achieving a team's aims. It should be noted too, that initiative implies that something will change concerning the process of cooperation or the task itself and that as a consequence the work result may often not be perfect. Mistakes can happen and may necessitate repeating a working process: therefore persistence is required by the person taking the initiative, e. g. in order to overcome the resistance of others.

Followers of these active performance concepts present different ideas of how to measure active performance itself. Frese et al. (1996; 1997) give priority to initiative among team members. We follow this concept here due to the fact that it is easily adaptable to the examination of the quality of teamwork quality. In addition, it is generally assumed that a high level of initiative is useful for a team because of the consequent greater potential to reach the desired goals, to recognize unexpected problems and to solve them (Morrison and Phelps, 1999). Additionally, Korunka and colleagues (2003) stressed the positive relation between initiative and success of organizations (see further Utsch and Rauch, 2000.

Nevertheless, a high level of initiative may also be judged critically by colleagues or supervisors, especially those who dislike changes (e.g. Baer and Frese, 2003). In addition, supervisors could gain the impression that high-initiative employees tend to rebel. Furthermore, several studies have pointed out that such highly motivated employees tend to exceed their competence boundaries (Fay and Frese, 2000). However many studies demonstrate that initiative is the key issue in a successful team. Baer and Frese (2003) showed for example that the success of a process of innovation depends on the employee's initiative. Old structures have to overcome to be successful, especially when companies try to develop new products or processes (Hoegl and Gemuenden, 2001). However, we do not want to state that initiative is always seen as a positive outcome. It is more a question

of the environment in which a team is located (contingency-approach). The literature agrees on the fact that at the front end—the really fuzzy front end such as in this study—initiative plays an important role due to the fact that usually in that stage the quantity of ideas is a crucial factor and the environment is very complex (Edmondson, 1999; 2012: 246f.; Fay and Frese, 2000; Moenaert et al., 1995). Thus, at the fuzzy front end, following the findings of Cooper and Kleinschmidt (1986) and Cooper (1990) is characterized by exploration.

When team members work in a more routine environment, that is, when we do not talk about the fuzzy front end of the new product development process, less initiative is needed (Edmondson, 2012: 247). But at the fuzzy front end, where creativity is needed, routines are less supportive. Thus, we follow the positive implications here.

Based on Hoegl and Gemuenden's (2001) detailed description of teamwork quality and its influence on team performance (also Hoegl and Parboteeah, 2007) and the findings of Frese and colleagues (1996; 1997) we argue that teamwork quality has a positive influence upon initiative. The following aspects can contribute to more successful achievement of the goals of an innovative team: it is decisive that a team has a self-starting nature, shows pro-active approaches while solving problems, and is persistent in overcoming difficulties (Frese et al., 1996; 1997). Apart from that, team members should communicate only relevant information (Hauptmann and Hirji, 1996; Hoegl & Parboteeah, 2007), coordinate their activities (Adler, 1995; Faraj and Sproull, 2000), mutually support each other (Cooke and Szumal, 1994; Tjosvold, 1984), establish and maintain work rules and norms of high effort (Hackman, 1987; Weingart, 1992) and take care to ensure an adequate level of team cohesion (Gully et al., 1995; Mullen and Cooper, 1994). It should be pointed out here that the positive effect of cohesion on performance was not confirmed by Janis (1995) although Gully et al. (1995) did prove in their meta-analysis that there was a positive correlation between team cohesion and team performance, as did another meta-analysis carried out by Mullen and Cooper (1994).

We argue that teamwork quality is likely to increase initiative in teams, as already indicated in diverse case studies (Hoegl and Gemuenden, 2001; Sethi and Nicholson, 2001) and in research by Hoegl and colleagues (2004). A team member who has his or her own individual incentives to work well together with the other team members is more willing to work in a team than others are. Furthermore, a team member recognizes that everybody in a team with high team quality contributes to the successful completion of the task. Therefore, a team member is more willing to make a contribution than non-members, even if it is an advance performance, when they know that all contributions are based on mutual reciprocity. Hence, we propose the following:

Hypothesis 1: Teamwork quality and initiative are positively related.

Climate of psychological safety in innovative teams

Psychological safety is usually raised in the light of its relationship to effort or performance (Brown and Leigh, 1996; Carrillo et al., 2004; Fong, 2003; Kahn, 1990). We follow the basic idea of Edmondson (1999; 2012) who defined psychological safety as a shared belief held by members of a team that provides a safe environment for interpersonal risk taking.

The research field concerning a psychological climate is characterized by a long history. Since the 1970s scholars have studied the meaning of individuals' work environment in a variety of contexts. Individuals' work perception of the environment's characteristics are referred to as psychological climate (James and Sells, 1981). The dominant approach in this field is the social constructionist perspective (e.g. Ashforth, 1985; Ashjanasy et al., 2000). Scholars in this field argue that individuals' perceptions arise primarily from their interaction with others and their relation towards the specific organizational context. Thus, the "construction" of their idea about work depends on their work environment (Ashforth, 1985; Ashjanasy et al., 2000; Schneider and Reichers, 1983). Research on climate in this field is based on the individuals' perceptions of work environment characteristics such as work environment in relation to bullying (Vartia, 1996), diversity (Kosse and Zonia, 1993), creativity and innovation (Ekvall, 1996), organizational trust (McKnight and Webster, 2001); safety (Flin et al., 2000), team climate (Anderson and West, 1996) and transfer of learning (Rouiller and Goldstein, 1993). In contrast to this research stream, the general psychological climate perspective focuses on the importance of personal values such as clarity, responsibility or support. Here, the emotional side plays a basic role that is rather negated in the social constructionist perspective. Thus, aspects such as leader facilitation and support, role stress and lack of harmony do play a significant role. Several researchers propose this approach, for example Kopelmann and colleagues (1990). In addition, Burke and colleagues (1992) argue that the values espoused by the organization towards its stakeholders are important for individuals' work perception. In this analysis, we refer to a specific psychological climate of safety in teams at the front end and pay attention to the interactions between team members. That means our study can be seen as belonging to the social constructionist research approach.

From our understanding, it is a climate of psychological safety that allows team members to feel accepted and respected by other team members and therefore to be creative and open to new ideas

(Edmondson, 2012: 281; Ajmal & Koskinen, 2008). The team members are no longer afraid of being blamed for any mistakes because they trust each other (Maurer et al., 2011). A climate of psychological safety is created especially by informal organizational practices that guide and support an open interactional environment (Baer and Frese, 2003; Brookes et al., 2006; Newell et al., 2004;). Edmondson (2012) uses the words "breaking down the boundaries". It can be seen that we follow the theories of Baer and Frese (2003) who extend the construct of team psychological safety to a specific organizational climate of psychological safety (a climate of psychological safety can be seen in several studies such as Neal et al. (2000)).

Ensuring a climate of psychological safety is very important for the success of teams at the front end (Carrillo et al., 2004; Fong, 2003; Hackman, 1987; Sundstrom et al., 1990) and is the basis for trusting behaviour between team members (Baer and Frese, 2003). The psychological climate for innovative teams should support freedom of expression and permit failure. In recent years there has been an increasing amount of literature dealing with the connection between psychological climate and teams (Ajmaland Koskinen, 2008; Gelfand et al., 2007). A positive psychological climate supports the initiative of team members in actively attacking problems or quickly taking advantage of opportunities that arise to successfully attain the desired goals (Baer & Frese 2003). Normally, a positive relationship between psychological safety and initiative is assumed (e.g. Karlsen and Gottschalk, 2004). Fay and Frese (2000) stressed the importance of such a climate to allow mistakes and to enhance initiative. In particular, Podsakoff et al. (2000) in his meta-analysis and Chen et al. (2002) in a study of teams, both succeeded in proving the relationship between a supportive leadership that creates a climate of psychological safety and better team initiative. Thus, we assume that a climate of psychological safety is able to moderate the relation between teamwork quality and initiative but is not able to influence the initiative directly (for a similar insight see Baer and Frese, 2003). Consequently, it can be reasonably assumed that initiative is decisively promoted by a climate of psychological safety as such a climate allows team members to make mistakes without being punished, to stop a project that has no prospect of success and to establish a high level of trust among the team members. Team members are stimulated to encourage each other to actively submit ideas and to take the initiative, while simultaneously promoting team initiative. Hence, we advance the following hypothesis:

Hypothesis 2: A climate of psychological safety moderates the relationship between teamwork quality and initiative.

Structured and unstructured teams

While scholars address various issues related to teams such as their effectiveness or efficiency (Hoegl and Parboteeah, 2007), the most effective number of team members (Hoegl, 2005) and the best leadership style for a successful team (Edmondson, 2012), we concentrate on the structure of a team in this study.

The structure of a team can be seen on two different levels: the macro and the micro level. Following the interpretation of Jones and Lichtenstein (2008) all teams are structured—on a macro-level. Jones and Lichtenstein (2008) point out that teams structure themselves by orientating to industry standards, norms and macro-climates, such as to the general organizational climate. Neal and colleagues (2000) for example indicate that teams are generally structured due to their organizational environment on a macro level. However, Neal and colleagues (2000) finally came to the conclusion that a general organizational climate did not contribute to organizational performance. They recommended concentrating on specific forms of organizational climate when specific organizational outcomes, such as safety, are of interest.

Thus, for the teams in our study we focus on the micro-level. We differentiate between structured and unstructured teams by team member rules (1), teamwork processes (2), and team targets (3) given by management. In a structured team every team member is responsible for a specific area, such as understanding the customer's point of view or information research, and the company establishes rules as to how the team members should work together (Pinto et al., 1993).

In unstructured teams the roles and responsibilities of team members are not defined. Unstructured teams are characterized by less formalization, which means an absence of rules and procedures that regulate team member behaviour. Several scholars have already demonstrated that the more unstructured a team is, the less initiative a team has (e.g. Lindner and Wald, 2010). However, due to the findings of the theory of self-organization, which stresses the role of human beings as being creative due to very complex circumstances (Hedberg et al., 1976; Weick, 1977), we argue that in the very early stage of a new product development processes unstructuredness respectively a self-designing system is needed (Goldstein, 1994). Although scholars of the self-organization theory are convinced that less structure respectively a self-designing system enhances the creative insight of a team, organizations tend to structure a team and spend a lot of money on controlling it (Hedberg et al., 1976; Weick, 1977). Based on the findings of the theory of self-organization we argue that at the fuzzy front end of the new product development process less structure is needed due to the presenced of higher creativity (Sicotte and Langley, 2000). As Hoegl (2005) demonstrated, creativity refers to the ability to take new perspectives on problems and apply persistence to the exploration of

new pathways to solve problems (also Amabile, 1996; Taggar, 2002). In innovative and complex projects routine processes cannot be easily developed to find solutions to problems (Ford, 1996). Those projects are usually characterized by high uncertainty. Thus, following the theory of self-organization, companies should avoid structuring their teams.

Thus, we hypothesize that the type of innovative team, i.e. whether it is structured or unstructured, has an influence on the level of initiative. Andrews and Smith (1996), for example, pointed out that a very structured process reduces creativity because process structures of communication and production of ideas that are put in place by outsiders are limiting. The idea behind that thought is that people are focused on tasks that are relevant for evaluation. Where the processes are clearly structured everybody knows what they have to do to receive a positive evaluation from top management. A positive evaluation may be either an intrinsic or extrinsic reward. When process structures are more informal employees do not appreciate them because the informal rules are not worth the effort of following. Thus, unstructured teams should display more initiative than structured teams according to the arguments of Tatikonda and Montoya-Weiss (2001, 156). In contrast to their argument, Werner and Lester (2001) pointed out that defined roles for team members are necessary to ensure all possible contributions by every team member. Furthermore, Huth (2008) shows that a clear assignment of roles and responsibilities raises the chances of team success (also Pinto et al., 1993). Hence, we formulate the following hypothesis:

> *Hypothesis 3: The structure of a team moderates the relationship between teamwork quality and initiative negatively.*

Based on the assumption that unstructured innovative teams show less initiative than structured teams show, we assume that the climate of psychological safety plays a vital role in the case of unstructured teams. Members of structured team demonstrate a greater degree of initiative because they do not feel as insecure as members of unstructured teams feel. The team structure (roles and processes), given by the supervisors or team leaders, reduces complexity and thus uncertainty. Team members are able to anticipate specific behaviours or decisions made by the organization (team leader), due to the effect of the given organizational structure at the team level. They can follow clear processes in order to demonstrate their effort. For team members in unstructured environments, that is, teams without clear processes and roles for their members, the perceived degree of complexity and uncertainty is higher (Andrews and Smith, 1996). Team members of unstructured teams are often unsure whether a specific behaviour is allowed or not or what role each member of

the team plays in completing the given task. Thus, team members in unstructured teams lack certainty about how to behave and react.

In complex and uncertain circumstances such as at the front end of a new product development process, when it is important for organizations not to structure their teams, they have to find alternative ways through which their team members can have certainty about how to show high initiative. Here, we assume that a climate of psychological safety might be able to enhance team initiative. A climate of psychological safety reduces complexity and uncertainty for the team members. Such a climate allows the team members to speak up safely and to take risks, which raises the level of initiative of an unstructured team. This assumption does not mean that a climate of psychological safety is an invitation for companies not to structure a team in any case or under any circumstances: for example, to save costs. We suggest that only in specific circumstances—such as at the fuzzy front end—such a climate might support the enhancement of initiative because organizations are not able to structure teams in these specific circumstances. Thus, we think that the initiative of an unstructured team can be enhanced by ensuring a climate of psychological safety. Hence, we propose the following hypothesis:

> *Hypothesis 4: A climate of psychological safety in unstructured teams moderates the relationship between teamwork quality and initiative positively in such teams.*

The theoretical model so far is shown in Figure 1.

Insert Figure 1 about here

METHOD

Sample and Data Collection

The hypotheses described above have been tested in an empirical investigation in a large multinational company in the field of consumer goods. The company's headquarters is located in Germany but the company operates in a multinational context. The brand is well known in Europe. At the

beginning of the study who surveyed 135 employees in the headquarters who were involved in teams at the front end of a new product development process to develop or create new ideas. Some of these teams were structured, which means the team members had given roles, processes and rules as to how they should work together, while the other teams were rather unstructured, being without such regulations. The classification into structured and unstructured teams was done by the top management of the company. The team members were from several departments and had been chosen to work as non-permanent team-members in such innovative teams.

For our analysis we used a standardised questionnaire in English. English was used because while the company's employees are drawn from many different countries the company's language is English. Thus, we can assume that everybody was able to understand the questions and give correct answers. Here, it was very important for us to make sure that we had included two to four people from every team in our sample. Furthermore we asked the company's top management to inform all participants of the relevance, targets and the context of our study to avoid a nonresponse bias. We also ensured the anonymity of the participants.

Pre-tests were conducted with ten employees from different innovative teams to test the clarity of the scales. In the pre-tests all respondents completed a questionnaire and were then involved in follow-up interviews. Their comments and suggestions were incorporated by removing ambiguities and other sources of confusion in the subsequent final questionnaire. Only small changes were required based on their comments, such as aspects of wording related to the specific context of the company.

The questionnaire was advertised online to these 135 participants, 80 of whom were members of structured teams at the front end and 55 participants of unstructured teams at the front end. The teams consisted of between four and seven members who worked in different departments of the multinational company and who belonged to the team only for a specific time and for a specific purpose. Every team ran for between three and four months. We worked closely with the company's top management and put considerable effort into determining the complexity of the teams' tasks to make sure that the tasks were comparable to each other.[2] Here, we referred to Weick (1977) who distinguish four main criteria for self-designing systems: 1) dependency of components in varying relationships; 2) influence of behaviour towards former behaviour (self-reference) as well as towards new behaviour; 3) no differentiation between organising, designing and leading parts in systems (redundancy); and 4) autonomy in systems.

[2] Many researchers point out that the complexity of a task could have an influence on project team performance. For example, Goessling and Knoben (2011) and Hackmann (1969).

The tasks were given by the company itself, which means that these tasks were not fictitious.

After three weekly follow-ups, 100 useable questionnaires were returned for evaluation, a return rate of 74%. Finally, our sample contains 70 participants from structured teams at the front end and 30 participants from unstructured teams at the front end.

Some characteristics of our sample are described in the following: 70 participants are male and 30 female. More than 50% of the participants belong to the Research & Development department or Marketing and Market Research. Other departments include supply chain (logistics), sales, IT, and purchasing. About 80% of all participants are between 26 and 45 years old. Most of the participants belong to the second or third management level in this multinational company. The first management level comprises division managers. The second management level comprises managers with leadership functions and the third management level is made up of employees without leadership functions. Both structured and unstructured teams have more male than female members. Twenty-one female team members are in structured teams and 11 are in unstructured teams. For an overview see Table 1.

Insert Table 1 about here

Measures

For all measurements other than team type and control variables, a Likert-type response from one (strongly agree) to seven (strongly disagree) was used (see appendix A and B).

Teamwork quality: Five teamwork quality factors - communication, coordination, mutual support, effort and coherence - were measured according to the criteria of Hoegl and Gemuenden (2001). Communication was measured using six items, with frequent, intensive, direct and personal communication considered as well as open information sharing and the timeliness of received information. Coordination was measured using four items. It was asked whether the work and connected subtask were well coordinated, duplication of effort is avoided and goals are clearly understood. Mutual support is also based on four items, with constructive discussions and respectful behaviour in focus. Effort was measured with three items dealing with if team members feel fully responsibil-

ity for the common task goal. The last input factor, coherence, was measured with three items regarding the personal attraction between the team members, the importance for a team member to be part of the team and the general feeling if the team sticks together.

*Climate of psychological safety***:** Psychological safety is measured according to the criteria set out by De Brentani and Kleinschmidt (2004) and van de Ven and Chu (1989). Participants were asked how management created a climate of psychological safety. The following aspects are in focus: the encouragement of team members to submit innovative ideas, the punishment for failure or cancellation of projects and members' level of trust in other team members.

*Team initiative***:** Here the readiness of team members to take the initiative is in focus. Based upon the findings of Baer and Frese (2003), seven items were measured. Team members were asked whether they search for solutions immediately, if they are active, use opportunities quickly and do more than they are asked to do.

Type of team: The control variable structuredness is assigned the value 0 if a team is unstructured and the value 1 if a team is structured. The assignment depends on two criteria: the role of members of the team and the processes established by management to achieve the task's aim. A structured innovative team is described as one in which every team member has a specific role and is responsible for a specific aspect of the task at hand. In addition, a structured innovative team has clearly defined processes and roles to achieve the task. The opposite is characteristic of unstructured innovative teams, which show neither defined processes nor pre-defined roles and responsibilities for team members.

Control variables: Studies of teams usually control for team size and organizational background (e.g. Bedeian and Mossholder, 2000; Berger and Cummings, 1979). Due to the fact that the team size varied from 4 to 7 members, only small differences might occur concerning this typical control item. Additionally, it was not allowed for us due to data privacy to combine our findings as to the efficiency of a specific team. Thus, we did not control for this item. Since the innovative teams in this study belong to one multinational company we do also not control for organizational background; however, we do control for participants' age and gender (see also Hoegl, & Gemuenden, 2001). The gender of a team member is reflected in a dichotomous variable (female versus male) and age is categorized using the following scale: < 25 years old, 26 to 35 years old, 36 to 45 years old, 46 to 56 years old and > 56 years old. Furthermore, we also determined whether the hierarchical level of the participants has an influence upon initiative (e.g. Hoegl and Gemuenden, 2001). The hierarchical level is asked by using the following categorical scale: $1^{st,}$ 2^{nd}, and 3^{rd} hierarchical level and "another work level". The first level is characterized by division managers; on the second

level are managers with leadership responsibility; on the third level are managers with no leadership responsibility.

Data analysis

Our data analysis procedure involved three main steps. First, we ran exploratory factor analyses to check for correlations with other factors. Our quality criteria for the exploratory factor analyses were the factor loading, the DEV, the indicator reliability, and the factor reliability. Second, we ran confirmatory factor analyses which were the basis for the subsequent OLS regressions. In these confirmatory factor analyses, the quality criteria are the Goodness-of-Fit Index (GFI), the Adjusted-Goodness-of-Fit Index (AGFI) and the Root Mean Square Residual (RMR), the DEV, and factor and indicator reliability. Third, we used a multistep linear regression analysis (OLS) to test our hypotheses. In this step we tested first the main effect from teamwork quality on initiative (model 1); then we added all four control items: age, gender, department, and hierarchical level (model 2). Afterwards we included both the factors structuredness and climate of psychological safety (model 3), before we tested separately both interaction effects (moderators) structuredness x teamwork quality and climate of psychological safety x teamwork quality (models 4 and 5). Finally, we compared both groups (structured and unstructured teams) to test if the climate of psychological safety might influence the relationship between teamwork quality and initiative more positively in unstructured teams (models 6 and 7).

RESULTS

Firstly, we evaluate all single factors of teamwork quality—coordination, communication, mutual support, effort and cohesion—by conducting first exploratory and second confirmatory factor analyses. As a result of the exploratory factor analyses, some indicators were eliminated due to very high correlations towards other factors (see appendix A and B). After highly correlated factors were discarded we included 15 of the original 20 items in the subsequent confirmatory factor analyses. These subsequent confirmatory factor analyses were the basis were the basis for the subsequent OLS regressions. We decided, due to the complexity of our model and the focus of our study, to aggregate the factors of teamwork quality to create one second-order factor, labelled team work quality (results see appendix C) (see for a similar procedure Hoegl &Parboteeah, 2007). Team initiative and the psychological climate of team safety were built by first order confirmatory factor analyses (see appendix B). However, we also tested the items by running exploratory factor analyses in advance. Based on the findings of the exploratory factor analyses, initiative was built by five items and climate of psychological climate by four items.

For a statistical overview as well as the correlations between the factors see Table 2.

Insert Table 2 about here

Secondly, we used linear regression analysis (OLS) based on the results of the confirmatory factor analyses to test the hypotheses following procedures suggested by Cohen and Cohen (1983) and Aiken and West (1991). The significance of the proposed interaction effects was assessed after all control variables and main effects had been entered. In testing our hypotheses we designed six regression models. Firstly, we will explain Models 1 to 4. In every model we include the control variables age, gender, department, and hierarchical level of team members. Details of the results from all models, including standardized coefficients, adjusted variance explained (adj. R-square), variance explained (R-square), Variance Inflation Factor (VIF) and goodness-of-fit measure (F-value) are documented in Table 3.

Insert Table 3 about here

As shown in Table 3, there is a high correlation between teamwork quality and initiative ($ß$ = 0.681***). Therefore hypothesis 1 can be confirmed. Furthermore it can be seen that none of the control variables show any significant correlation. Therefore we can confirm the general assumption found in the literature: teamwork quality is positively correlated to initiative in innovative teams. In a further test we included both the factors structuredness and climate of psychological safety. While climate of psychological safety shows a strong significant influence, the effect of structuredness on initiative is less strong and less significant. In the next step we added the moderator variable structure x teamwork quality. It can be seen that this moderator has a slightly significant negative influence on the model. Thus, the results indicate that the structure of a team, i.e. whether it is structured or unstructured, moderates the relationship between teamwork quality and initiative. In addition the negative factor loading of the moderator helps to confirm hypothesis 3. Therefore we can say that the more unstructured a team at the front end is, the weaker the relationship between teamwork quality and initiative. The climate of psychological safety is added in model 4 to determine whether it might moderate the relationship between teamwork quality and initiative. We found

only a very low positive influence of the moderator climate of psychological safety x teamwork quality on the relationship between teamwork quality and initiative (ß = 0.038.

To prove the fourth hypothesis, that the climate of psychological safety influences the relationship between teamwork quality and initiative more positively in unstructured innovative teams than in structured innovative teams, we have to divide the data into two groups.[3] Here, we can control whether the influence of the psychological climate is different in structured and unstructured teams and answer the question of whether the climate of psychological safety can raise the initiative of an unstructured team to a level comparable with that seen in structured teams. Both models can be seen in Table 4. Model 5 controls for the influence of the climate of psychological safety in structured teams (TS) and model 6 controls for the influence of the climate of psychological safety in unstructured teams (UST).

Insert Table 4 and Figure 2 about here

The results of model 5 and model 6 as well as those shown in Figure 2 provide strong support for hypothesis 4. The climate of psychological safety shows a strong association with initiative in unstructured innovative teams. In structured innovative teams the moderator variable is not even significant (ß = 0.018). Finally, we can say that the control variables can be ignored since no decisive influence can be seen, despite the hierarchical level of the team members in unstructured teams. Therefore, the last hypothesis can be confirmed.

DISCUSSION AND FUTURE RESEARCH

This research yields two key findings. (1) Initiative in unstructured innovative teams is lower than is initiative in structured innovative teams. Therefore, structured innovative teams are usually more successful than unstructured innovative teams. This implies that companies should structure their teams to make them more successful by means of initiative, but also usually implies high costs in coordinating and organizing all the processes and the roles of the team members. (2) A climate of psychological safety has a moderating influence upon teamwork quality and initiative. In unstructured teams a climate of psychological safety supports initiative.

[3] All typical goodness-of-fit measures for dividing a sample are fulfilled.

Our findings support the assumption that structured innovative teams are willing to do more than they are asked to do, to actively attack problems and are quick to take advantage of opportunities to attain their goals more rapidly. Unstructured teams display these aspects in lower degree, but are otherwise usually more creative and innovative, based on the fact that all roles and responsibilities as well as process structures to solve a task are not already given. The findings of Hirst et al. (2011) that less centralisation influences creativity positively underline our results. Decentralised decision making is attractive for team member's initiative. This first finding is not surprising as many researchers have already pointed out this effect (e.g. Andrews and Smith, 1996). But the idea of the development of a climate of psychological safety that could reduce this negative effect is new. We have demonstrated that a climate of psychological safety moderates the relationship between teamwork quality and initiative, although the effect is small. We analyzed whether a difference in the influence of the psychological climate can be identified if the innovative team is structured or not, and we could demonstrate that the psychological climate moderates positively the relationship between teamwork quality and initiative in unstructured innovative teams ($ß = 0.26$*).

In structured innovative teams the effect of the psychological climate upon the relationship between teamwork quality and initiative is not significant ($ß = 0.018$). This finding underlines the idea that a climate of psychological safety can enhance the initiative of an unstructured innovative team. Accordingly, we assume that it might be possible for companies to profit from the advantages of unstructured innovative teams (more creativity, new solutions: see Hirst et al. (2011), Bolin and Härenstam (2008)) because we were able to show unstructured teams that are supported by a climate of psychological safety will do better than unstructured teams that are *not* supported by a climate of psychological safety. This finding accentuates the importance of a climate of psychological safety, given by top management, on the micro-level in these specific circumstances: the fuzzy front end of the new product development process.

However, some limitations of this study have to be noted. First, the data for this research are cross-sectional rather than longitudinal. A longitudinal study would help to get information about causality relationships and the development of a climate of psychological safety and initiative over time. Second, we assume the more complex a task is the more important is a climate of psychological safety and the more important is teamwork quality. Hence, when tasks are routine (sometimes projects have very low levels of uncertainty and complexity), the psychological climate has less effect on initiative and other factors such as external team relations or organizational structures may be more important. Third, a limitation can be seen in the self-reported survey. This can cause biased relationships due to common method bias. However, this study uses a strong theoretical approach to strengthen the results. Therefore self-reported statements were necessary to evaluate what individu-

al mechanism lead to the perception of a climate of psychological safety. Nevertheless, to reduce the potential risks of common method bias different suggestions on questionnaire design formulated by Podsakoff et al. (2003) were followed. The survey assured anonymity to the participants and also assured them that there was no right or wrong answer. Lastly our study concentrates only on the micro-level of teams and does not regard the general social and structural embeddedness of teams (Jones and Lichtenstein, 2008).

Perhaps the most important issue for further research derives from the effect of a climate of psychological safety. As this study provides empirical evidence that a positive psychological climate is an important success factor of unstructured teams, it seems necessary to ask about the major antecedents of a climate of psychological safety. What can managers of teams at the front end do to encourage a climate of psychological safety? Existing theoretical models of the influence of psychological climate and a few empirical findings (Baer, & Frese, 2003; Frese et al., 1997; Hackman, 1987; Sundstrom et al., 1990) provide a valuable starting point for necessary empirical research in this field.

CONCLUSION

Our study shows that unstructured teams at the micro-level that are supported by a climate of psychological safety will do better than unstructured teams that are *not* supported by a climate of psychological safety. Therefore, companies should develop a climate of psychological safety in unstructured teams in specific circumstances such as the fuzzy front end where exploration of ideas is needed. The challenge is therefore to establish such a climate of psychological safety.

REFERENCES

Adenfelt, M, and K Lagerstroem (2006). Enabling knowledge creation and sharing in transnational projects, ***International Journal of Project Management***, 24(3), 191–198.

Adler, PS (1995). Interdepartmental interdependence and coordination: The case of the design/manufacturing interface. ***Organization Science***, 6, 147-167.

Ajmal, M.M., & Koskinen, K.U. 2008. Knowledge transfer in project-based organizations: an organizational culture perspective. ***Project Management Journal***, 39: 7-15.

Amabile, T.M., 1983. The social psychology of creativity: a componential conceptualization. ***Journal of Personality and Social Psychology*** 45, 57–376.

Anderson, N.R. and West, M.A. 1996. The team climate inventory: Development of the TCI and its application in teambuilding for innovativeness. ***European Journal of Work and Organizational Psychology***, 5: 53-66.

Andrews, J. & Smith, D. C. 1996. In Search of Marketing Imagniation: Factors Affecting the Creativitiy of Marketing Programs for Mature Products. ***Journal of Marketing Research***, 33: 174-187.

Ashforth, B.E. 1985. Climate formation: Issues and extensions. ***Academy of Management Review***, 4: 837-847.

Ashkanasy, N.M., Wilderom, C.P.M., & Peterson, M.F. 2000: ***Handbook of Organizational Culture & Climate***, Thousand Oaks: Sage.

Baer, M. & Frese, M. 2003. Innovation is not enough: climates for initiative and psychological safety, process innovations, and firm performance. ***Journal of Organizational Behavior***, 24: 45-68.

Bakker, A., Tims, M., & Derks, D. 2012. Proactive personality and job performance: The role of job crafting and work engagement***. Human Relations***, 65: 1359-1378

Bedeian, A. G., & Mossholder, K. W. 2000. On the Use of the Coefficient of Variation as a Measure of Diversity. ***Organizational Research Methods***, 3: 285-297.

Berger, C. J., Cummings, L.L. 1979. Organizational structure, attitudes, and behaviors. In B.M. Staw (Ed.), ***Research in organizational behavior,*** vol. 1: 169-208. Greewhich, CT: JAI Press.

Bolin, M, & Härenstam, A. 2008. An empirical study of bureaucratic and post-bureaucratic characteristics in 90 workplaces. ***Economic and Industrial Democracy***, 29: 541-564.

Brem, A., & Voigt, K.-I. 2009. Integration of market pull and technology push in the corporate front end and innovation management—Insights from the German software industry. ***Technovation***, 29: 351-367.

Brookes, N.J., Morton, S.C., Dainty, A.R.J., & Burns, N.D. 2006. Social processes, patterns and practices an project knowledge management: a theoretical framework and an empirical investigation. ***International Journal of Project Management***, 24: 474-482.

Brown, S. P., & Leigh, T. W. 1996. A new look at psychological climate and its relationship to job involvement, effort, and performance. ***Journal of Applied Psychology***, 81: 358–368.

Burke, M.J., Borucki, C.C., & Kaufman, J.D. 2002. Contemporary perspectives on the study of psychological climate: A commentary. ***European Journal Of Work & Organizational Psychology***, 11: 325-340.

Campion, M, Medsker, G.J., & Higgs, A.C. 1993. Relations between Work Group Characteristics and Effectiveness: Implications for Designing Effective Work Groups. ***Personnel Psychology***, 46: 823-850.

Carrillo, P., Robinson, H., Al-Ghassani, A., & Anumba, C. 2004. Knowledge management in UK constructions: strategies, resources and barriers. ***International Journal of Project Management***, 35: 46-56.

Crawford, C. 1980. Defining the Charter for Product Innovation. ***Sloan Management Review***, 22, 3-12

Chen, G., Webber, S. S., Bliese, P. D., Mathieu, J. E., Payne, S. C., Born, D. H. & Zaccaro, S. J. 2002. Simultaneous examination of the antecedents and consequences of efficacy beliefs at multiple levels of analysis. ***Human Performance***, 15: 381-409.

Cohen, J., & Cohen, P. 1983. ***Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences***, Hillsdale.

Cooke, R. A., & Szumal J. L. 1994. The impact of group interaction styles on problem-solving effectiveness. ***Journal of Applied Behavioral Science***, 30: 415-437.

Cooper, R.G. 2001. ***Winning with new Products: Accelerating the process from idea to launch***, Cambridge.

Cooper, R.G., & Kleinschmidt, E.J. 1986. An investigation into the new product process: Steps, deficiencies, and impact. ***Journal of Product Innovation***, 3: 71-85.

Crant, J. M. (1995). The proactive personality scale and objective job performance among real

estate agents. Journal of Applied Psychology, 80, 532-537.

Davenport, T. 1993. ***Process Innovation–Reengineering work through Information Technology***. Harvard Business School Press, Boston.

De Brentani, U. and Reid, S. E. 2012. The Fuzzy Front-End of Discontinuous Innovation: Insights for Research and Management. ***Journal of Product Innovation Management***, 29: 70–87.

De Brentani, U., & Kleinschmidt, E.J. 2004. Corporate culture and commitment: Impact on performance of international new product development programs. ***Journal of Product Innovation Management***, 21: 309-333.

Drucker, P.F. 1999. Knowledge-Worker Productivity: The biggest challenge. **California management review**, 41, 79-94.

Edmondson , A. 1999. Psychological Safety and learning behavior in work project teams. ***Administrative Science Quarterly,*** 44: 350-383.

Edmondson, A. (2012). Teaming. How organizations learn, innovate and compete in the knowledge economy, Harvard Business School, Jossey-Bass.

Ekvall, G. (1996) The Organizational Climate for Creativity and Innovation. ***European Journal of Work and Organizational Psychology***, 5, 105–23.

Fay, D., & Frese, M. 2000. Conservatives' Approach to Work: Less Prepared for Future Work Demands?. ***Journal of Applied Social Psychology***, 30: 171-195.

Flin, R., Mearns, K., O'Connor, P., & Bryden, R. 2000. Safety climate: Identifying the common features. Safety Science, 34: 177-192.

Faraj, S., & Sproull, L. 2000. Coordinating expertise in software development project teams. ***Management Science***, 46: 1554-1568.

Fong, P.S.W. 2003. Knowledge creation in multidisciplinary project teams: an empirical study of the process and their dynamic interrelationships. ***International Journal of Project Management***, 21: 479-486.

Ford, C.M., 1996. A theory of individual creative action in multiple social domains. **Academy of Management Review** 21(4), 1112–1142.

Forrester, W., & Tashchian, A. 2006. Modeling the Relationship between Cohsion and Performance in Student Work Groups. ***International Journal of Management***, 23: 458-464.

Frese, M., Fay, D., Hilburger, T., Leng, K., & Tag, A. 1997. The concept of personal initiative: Operationalization, reliability, and validity in two German samples. ***Journal of Organizational and Occupational Psychology***, 70: 139-161.

Frese, M., Kring, W., Soose, A., & Zempel, J. 1996. Personal initiative at work: Differences between East and Wet Germany. ***Academy of Management Journal***, 39: 37-63.

Gelfand, M.J., Erez. M., & Aycan, Z. 2007. Cross-cultural organizational behaviour. ***Annual Review of Psychology***, 58: 479-514.

Gladstein, D.L. 1984. Groups in Context: A model of task group effectiveness. ***Administrative Science Quarterly***, 29: 499-517.

Goessling, T. & Knoben, J. 2011. Proximity and duration in temporary organisations. ***International Journal of Strategic Business Alliances***, 2 (3), 207-220.

Goldstein, E.G. 1994. Self-disclosure in treatment. What therapists do and don't talk about. ***Clinical Social Work Journal***, 22: 417–433.

Griffin, M. A., & Hauser, J. R. 1992. Patterns of Communication among Marketing, Engineering and Manufacturing: A comparison between two new product project teams. ***Management Science***, 38: 360-373.

Griffin, M. A., Neal, A., & Parker, S. K. (2007). A new model of work role performance: Positive behavior in uncertain and interdependent contexts. ***Academy of Management Journal***, 50, 327-347.

Gully, S. M., Devine, D.J., & Whitney, D.J. 1995. A meta-analysis of cohesion and performance: Effects of level of analysis and task interdependence. ***Small Group Research***, 26: 497-520.

Hackman, J. R. (1969). Toward understanding the role of tasks in behavioral research. *Acta Psychologica*, *31*, 97-128.

Hackman, J.R. 1987. ***The design of work project teams*** In Lorsch, J.W. (Ed.) Handbook of Organizational Behavior, 315-342. Engelwood Cliffs.

Hall, R.D. 1999. ***Organizations: Structures, processes and outcomes***, London: Prentice-Hall.

Hauptman, O.K., & Hirji, K. 1996. The influence of process concurrency on project outcomes in product development: An empirical study of cross-functional project teams. ***IEEE Transactions on Engineering Management***, 43: 153-164.

Hedberg, B.L.T., Nystrom P.C., Starbuck, W.H. 1976. Camping on Seesaws: Prescriptions for a Self-Designing Organization, ***ASQ***, 21: 41 – 65.

Hirst, G., Knippenberg, D.van, Chen, C.-H. and Sacramento, C. A. 2011. How dies buresaucracy impact individual creativity? A cross-level investigation of team contextual influences on goal orientation-creativity relationships. ***Academy of Management Journal***, 54: 624-641.

Hoegl, M., & Gemuenden, H.G. 2001, Project teamwork quality and the success of innovative projects. A theoretical concept and empirical evidence. ***Organizational Science***, 12: 435-449.

Hoegl, M., Weinkauf, K., & Gemuenden, H.G. 2004, Interproject team coordination, project commitment, and project teamwork in multiproject team R&D projects: A longitudinal study. ***Organizational Science,*** 15: 38-55.

Hoegl, M., & Proserpio, L. 2004. Team member proximity and teamwork in innovative projects. ***Research Policy***, 33, 1153-1165.

Hoegl, M. 2005. Smaller teams—better teamwork: How to keep project teams small, ***Business Horizons*** (2005) 48, 209 - 214.

Hoegl, M., & Parboteeah, K.P. 2007. Creativity in innovative projects: How teamwork ***matters. Journal of Engineering and Technology Management***, 24, 148-166.

Hoegl, M., Ernst, H. and Proserpio, L. 2007. How Teamwork Matters More as Team Member Dispersion Increases. ***Journal of Product Innovation Management***, 24,156–165.

Huth, T. 2008. ***Organizing Cross-Functional New Product Development Projects. The Phase-Specific Effects of Organizational Antecedents***, Wiesbaden: Gabler.

Ilgen, D.R., & Pulakos, E.D. 1999. ***Introduction: Employee performance in today's organizations***. In D.R. Ilgen & E.D. Pulakos (Eds.) The changing nature of performance, 1–18, San Francisco, Jossey Bass.

James, L.R., & Sells, S.B. 1981. ***Psychological climate: Theoretical perspectives and empirical research***. In D. Magnusson (Ed.) Toward a psychology of situations: An international perspective, 275-295, Hillsdale, NJ: Erlbaum.

Janis, I.L. 1995. ***Groupthink***. In B.N. Staw (Ed) Psychological Dimensions of Organizational Behavior, 391-399, Prentice-Hall, Englewood Cliffs.

Jones, C., & Lichtenstein, B. 2008. ***Temporary inter-organizational projects: how temporal and social embeddedness enhance coordination and manage uncertainty***. In Cropper, S., Ebers, M., Huxham, C., Smith Ring, P. (Eds.), The Oxford Handbook of Inter-Organizational Relations, 231–255, Oxford, UK.

Kahn, W. A. 1990. Psychological conditions of personal engagement and disengagement at work. ***Academy of Management Journal***, 33: 692–724.

Kanter, R.M. 1995. Unternehmenspartnerschaften: Langsam zueinander finden. ***Harvard Business Manager***, 17: 33-44.

Karlsen, J.T., & Gottschalk, P. 2004. Factors Affecting Knowledge Transfer in IT Projects. **Engineering Management Journal**, 16: 3-11.

Kim, J., & Wilemon, D. 2002. Focussing the fuzzy front-end in new product development. ***R&D Management***, 32: 269-279.

Koen, P., Ajamian, G., Boyce, S., Clamen, A. Fisher, E., Fountoulakis, S., Johnson, A., Puri, P. and Seibert, R. 2002. ***Fuzzy Front End: Effective Methods, Tools and Techniques***. In: Bellvieau, P., Griffin, A. and Sommermeyer, S. (Eds.) The PDMA Tool-Book for New Product Development, New York, 5-36.

Koop, S., De Reu, T., & Frese, M. (2000). Sociodemographic factors, entrepreneurial orientation, personal initiative, and environmental problems in Uganda. In M. Frese (Ed.), Success and failure of microbusiness owners in Africa: A psychological approach (pp. 55-76). Westport, Ct.: Quorum.

Kopelman, R.E., Brief, A.P., & Guzzo, R.A. 1990: The Role of Climate and Culture in Productivity. In: Schneider, B. (Ed.) Organizational Climate and Culture, 282-318, San Fancisco: Jossey-Bass.

Korunka, C., Scharitzer D., & Sonnek A. 2003. Mitarbeiter-und Kundenzufriedenheit in öffentlichen Organisationen. ***Zeitschrift für Arbeits-und Organisationspsychologie A&O*** 47: 208-221.

Kossek, E.E., & Zonia, S.C. 1993. Assessing diversity climate: a field study of reactions to employer efforts to promote diversity. ***Journal of Organizational Behavior***, 14: 61–81.

Kozlowski, S. W., & Ilgen, D. R. 2006. Enhancing the Effectiveness of Work Groups and Project teams. ***Psychological Science in the Public Interest***, 7: 77-124.

Krauss, S. I., Frese, M., Friedrich, C., & Unger, J. (2005). Entrepreneurial orientation and success: A psychological model of success in Southern African small scale business owners. European Journal of Work and Organizational Psychology, 14, 315-344.

Leifer, R., McDermott, C.M., O'Connor, G., Peters, L.S., Rice, M., & Veryzer, J.W. 2000. ***Radical Innovation: How Mature Companies Can Outsmart Upstarts***. In Harvard Business School Press Books.

Levin, G., & Skulmoski, G. 2001. Creating the environment for successful projects. ***ESIHorizonts,*** 2: 1-3.

Li, H. 2008. ***A Theory of Intra unit Justice Climate and Team Effectiveness***. Dissertation, University of Arizona.

Lindner, F., & Wald, A. 2011. Success Factors of Knowledge Management in Temporary Organizations. ***International Journal of Project Management***, 29: 877-888.

Magni, M., Maruping, L., & Hoegl, M. (in press). Managing the unexpected across space: Improvisation, dispersion and performance in NPD teams. ***Journal of Product Innovation Management***, 30: 1009-1026.

Martinsuo, M. & Poskela, J. 2011. Use of evaluation criteria and innovation performance in the front end of innovation. ***Journal of Product Innovation Management,*** 28, (6), 896-914.

Maurer, I., Bartsch, V., & Ebers, M. 2011. The value of intra-organizational social capital: How it fosters knowledge transfer, growth and innovation performance. ***Organization Studies***, 32: 157-185.

McGrath, J.E. 1964. ***Social Psychology A brief introduction***. New York: Holt

McKnight, H., & Webster, J. 2001. ***Collaborative insight or privacy invasion? Trust climate as a lens for understanding acceptance of awareness systems***. In C. Cooper, S. Cartwright, & C. Earley (Eds.), The international handbook of organizational culture and climate (pp. 533–555). Chichester, England: John Wiley & Sons.

Miron, E., Erez, M., & Naveh, E. (2004). Do personal characteristics and cultural values that promote innovation, quality, and efficiency compete or complement each other? Journal of Organizational Behavior, 25, 175 - 199

Moenaert, R.K., Souder, W.E., De Meyer, A., & Deschoolmeester, D. 1995. R&D/Marketing Communcation during the Fuzzy Front End. ***IEEE Transactions on Engineering Management***, 42: 243-258.

Morrison, E.W., & Phleps, C.C. 1999. Taking charge at work: extrarole efforts to initiate workplace change. ***Academy of Management Journal,* 42: 403-419.**

Mowery, D.C., Rosenberg, N. 1998. ***Paths of Innovation: Technological Change in 20th-Century America***. Cambridge Univ. Press, New York.

Mullen, B., & Cooper, C. 1994. The relation between groups cohesiveness and performance. An integration. ***Psycholgical Bulletin***, 115: 210-227.

Murphy, S. A. and Kumar, V. 1997. The front end of new product development: A Canadian survey. ***R&D Management***, 27: 5-15.

Neal, A., Griffin, M. A., & Hart, P. M. 2000. The impact of organizational climate on safety climate and individual behavior. ***Safety Science***, 34, 99– 109.

Newell, S., Tansley, C., & Huang, J. 2004. Social capital and knowledge integration in and EPR project team: the importance of bridging and bonding. ***British Journal of Management***, 15: 24-37.

Nobelius, D. and Trygg, L. 2002. Stop chasing the Front End process – management of the early phases in product development projects. ***International Journal of Project Management***, 20: 331-340.

Pinto, M. B., Pinto, J.K., & Prescott, J.E. 1993. Antecedents and Consequences of Project Project team Cross-Functional Cooperation. ***Management Science***, 39: 1281-1297.

Podsakoff, P.M., MacKenzie, S.B., Jeong-Yeon, L., & Podsakoff, N.P. 2003. Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. ***Journal of Applied Psychology***, 88: 879-903

Podsakoff, P.M., Scott B., MacKenzie, J.B.P., & Bachrach, D. G. 2000. Organizational Citizenship Behaviors: A Critical Review of the Theoretical and Empirical Literature and Suggestions for Future Research. ***Journal of Management***, 26: 513–563.

Poskela, J. & Martinsuo, M. 2009. Management control and strategic renewal in the front end of innovation. ***Journal of Product Innovation Management***, 26, (6), 671-684.

Puck, J.D. & Rygl, E.A. 2006. Cultural Antecedents and Performance Consequences of Open Communication and Knowledge Transfer in Multicultural Process-Innovation Project teams. ***Journal of Organizational Transformation and Social Change***, 3: 223-241.

Reid, S.E., & de Brentani, U. 2004. The Fuzzy Front End of New Product Development for Discontinuous Innovations: A Theoretical Model. ***Journal of Product Innovation Management***, 21: 170-184.

Rouiller, J.Z., & Goldstein, I.L. 1993. The relationship between organizational transfer climate and positive transfer of training. ***Human Resource Development Quarterly***, 4: 377–390.

Sandmeier, P, Jamali, N. Kobe, C., Enke, E. Gassmann, O. and Meier, M. 2004. ***Towards a structured and integrative front-end of product innovation***, Proceedings of the R& D Management Conference, Sesimbra.

Schneider, B., & Reichers, A.E. 1983. On the etiology of climates. ***Personnel Pschology***, 36: 19-39.

Seibert, S. E., Crant, J. M., & Kraimer, M. L. (1999). Proactive personality and career success. Journal of Applied Psychology, 84, 416–427.

Sethi, R., & Nicholson, C.Y. 2001. Structural and contextual correlates of charged behavior in product development teams. ***Journal of Product Innovation Management***, 18: 154–168.

Sicotte, H., Langley, A., 2000. Integration mechanisms and R&D project performance. ***Journal of Engineering and Technology Management*** 17, 1–37.

Singh, R.P. (2000). Entrepreneurial Opportunity Recognition through Social Networks, New York.

Sundstrom, E., De Meuse, K.P & Futrell, D. 1990. Work Project teams: Applications and Effectiveness. ***American Psychologist***, 45: 120-133

Taggar, S., 2002. Individual creativity and group ability to utilize individual creative resources: a multilevel model. ***Academy of Management Journal*** 45 (2), 315–330.

Tatikonda, M.V. & Montoya-Weiss, M.M. 2001. Integrating Operations and Marketing Perspectives of Product Innovation: The Influence of Organizational Process Factors and Capabilities on Development Performance. ***Management Science***, 47: 117-154.

Tjosvold, D. 1984. Cooperation theory and organizations. ***Human Relations***, 37: 743-767.

Urban, G.L., Hauser, J.R. 1993. ***Design and marketing of new products***. Englewood Cliffs, NJ: Prentice Hall.

Utsch, A., & Rauch, A. (2000). Innovativeness and initiative as mediators between achievement orientation and venture performance. European Journal of Work and Organizational Psychology, 9, 45-62.

Van de Ven, A. H., & Chu, Y.-H. 1989. *A* ***psychometric assessment of the Minnesota innovation survey***. In Van de Ven, A.H., Angle, H.L. & Poole, M.S. (Eds.). Research on the management of innovation: the Minnesota studies, 55-103, Oxford.

Vartia, M. 1996. The sources of bullying - psychological work environment and organizational climate. ***European Journal of Work and Organizational Psychology***, 5: 203-214.

Veryzer, R.W. 1998. Discontinuous innovation and the new product development process. ***Journal of Product Innovation Management***, 15: 304-321.

Weingart, L.R. 1992. Impact of group goals, task component complexity, effort, and planning on group performance. ***Journal of Applied Psychology***, 77: 682-693.

Werner, J.M. & Lester, S.W. 2001. Applying a Project team Effectiveness Framework tot he Performance of Student Case Project teams. ***Human Resource Development Quarterly***, 12: 385-402.

Zarraga, C. & Bonache, J. 2003. Assessing the project team environment for knowledge sharing: an empirical analysis. ***International Journal of Human Resource Management***, 14: 1227-1245.

FIGURES

Figure 1. Theoretical model

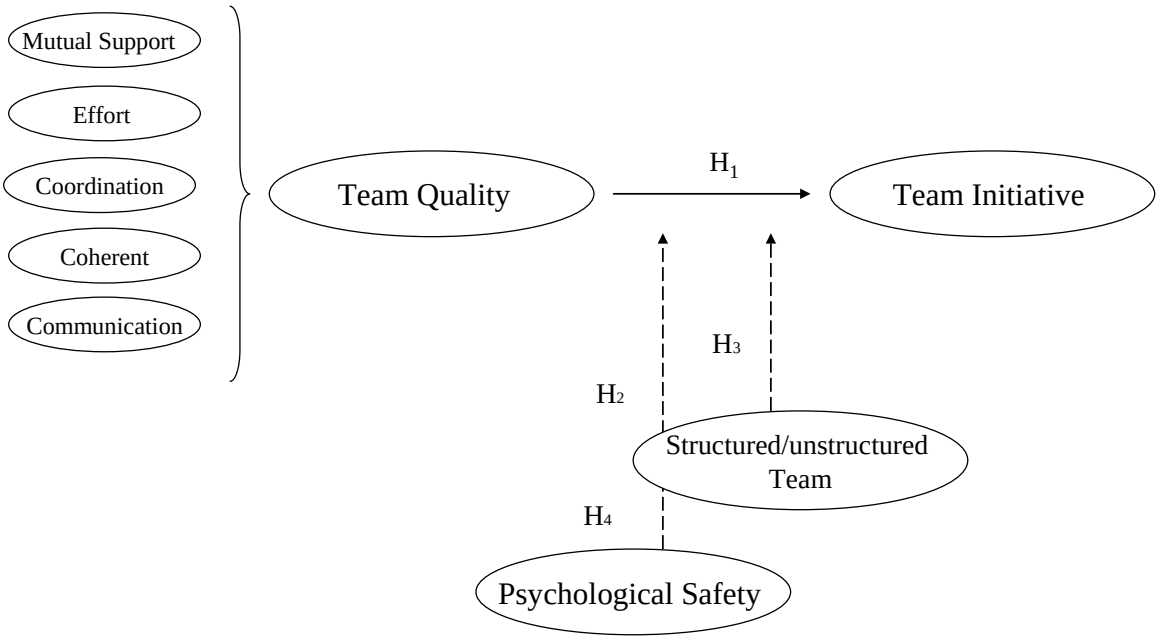
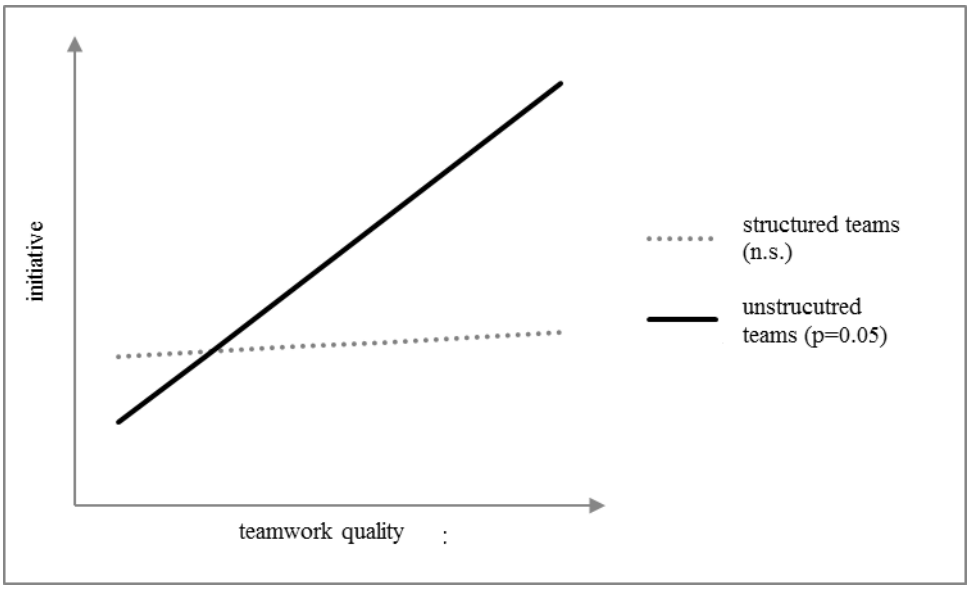


Figure 2: Moderating influence of climate of psychological safety



TABLES

Table 1: Characteristics of the sample

Characteristics		**Number of team members**
Type of team		**100**
	Structured teams	70
	Unstructured teams	30
Gender		
Structured teams	*Female*	21
	Male	49
Unstructured teams	*Female*	11
	Male	19
Department		
Structured teams	*Marketing*	24
	Market Resarch	7
	Research & Development	19
	Supply chain	5
	Sales	8
	Others e.g. logisitics, IT	7
Unstructured teams	*Marketing*	8
	Market Resarch	1
	Research & Development	9
	Supply chain	4
	Sales	4
	Others e.g. logisitics, IT	4
Age		
Strucutred teams	*< 25*	0
	26-35	24
	36-45	33
	46-55	10
	> 55	3
Unstrucutred teams	*< 26*	0
	26-35	12
	36-45	11
	46-56	6
	> 56	1
Hierarchical level		
Structured teams	*First level*	2
	Second level	46
	Third level	17
	Other level	5
Unstructured teams	*First level*	0
	Second level	21
	Third level	9
	Other level	0

Table 2: Correlation table

Variable	M	SD	1	2	3	4	5
Hierarchical level	3.13	0.849	-------				
Age	2.88	0.82	*-0.326*	-------			
Department	3.05	0.93	0.021	*0.297*			
Teamwork quality	2.24	1.002	0.085	-0.049	-0.138		
Climate of psychological safety	4.52	0.193	0.112	-0.039	0.035	*0.473*	
Initiative	4.98	1.021	*0.599*	-0.066	0.129	*0.679*	*0.324*

Legende: M = Mean value SD = Root mean square deviation ; no inclusion of gender and structurdness due to nominal scales; italics = correlation is significant on a 0.01 level

Table 3: Regression analyses (Model 1 – 4)

Dependent variable: initiative	Model 1			Model 2			Model 3			Model 4		
	Beta	SD	Sig.	Beta	SD	Sig.	Beta	SD	Sig.	Beta	SD	Sig.
Teamwork quality	0.681	0.076	0.000	0.512	0.087	0.000	0.365	0.113	0.001	0.359	0.182	0.022
Climate of psychological safety				0.307	0.070	0.000	0.266	0.800	0.005	0.282	0.068	0.001
Structuredness*				0.172	0.183	0.075	0.183	0.133	0.029	0.102	0.015	0.132
Structuredness x Teamwork quality							-0.104	0.106	0.079			
Climate x Teamwork quality										-0.038	0.092	0.528
Age	0.073	0.102	0.374	0.078	0.096	0.314	0.053	0.096	0.494	0.083	0.068	0.296
Gender*	0.510	0.084	0.509	0.048	0.079	0.514	0.036	0.077	0.614	0.055	0.079	0.454
Department	-0.060	0.042	0.449	-0.087	0.040	0.252	-0.084	0.039	0.263	-0.103	0.041	0.186
Hierarchical level	-0.121	0.098	0.141	-0.140	0.092	0.072	-0.126	0.090	0.095	-0.137	0.093	0.079
R^2	0.494	0.745		0.561	0.702		0.499	0.679		0.561	0.705	
adj. R^2	0.467	0.745		0.528	0.702		0.452	0.679		0.523	0.705	
F	18349		0.000	16792		0.000	13449		0.000	14558		0.000

Legend: Beta = Regression Coefficient SD = Root Mean Sig. = Signifikanzniveau; VIF = Variance Inflation Factor

	Model 4 (ST; N = 70)				**Model 5 (UST; N = 30)**			
Dependent variable: initiative	Beta	SD	Sig.	VIF	Beta	SD	Sig.	VIF
Teamwork quality	0.572	0.107	0.000	1.358	0.317	0.145	0.038	2.368
Climate of psychological safety	0.163	0.105	0.126	1.358	0.629	0.148	0.000	1.928
Climate x Teamwork quality	0.018	0.102	0.863	1.097	0.260	0.117	0.035	1.147
Age	0.095	0.099	0.340	1.075	-0.085	0.061	0.179	1.243
Gender	-0.050	0.230	0.035	1.112	0.051	0.116	0.661	1.083
Department	-0.013	0.314	0.412	1.092	-0.365	0.087	0.017	1.363
Hierarchical level	-0.013	0.048	0.795	1.092	-0.122	0.124	0.015	1.423
R^2	0.499	0.497			0.770	0.770		
adj. R^2	0.424	0.452			0.672	0.710		
F	10.476		0.000		12.841		0.000	

Legende: beta = Regressionskoeffizient; SD = Standardabweichung; Sig. = Signifikanzniveau; VIF = Variance Inflation Factor